De Motu Corporum

Eodem modo demonſtratur, quod corpus hac vi centripeta in centrifugam verſa movebitur in hyperbola oppoſita.

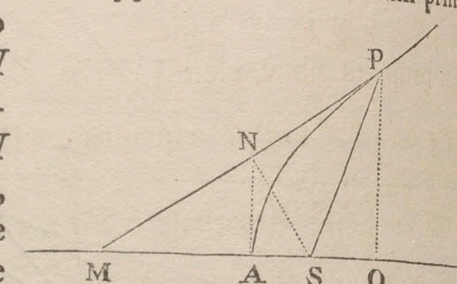
LEMMA XIII.

Latus rectum parabolæ ad verticem quemvis pertinens eſt quadruplum diſtantiæ verticis illius ab umbilico figuræ. Patet ex conicis.

LEMMA XIV.

Perpendiculum, quod ab umbilico parabolæ ad tangentem ejus demittitur, medium eſt proportionale inter diſtantias umbilici a puncto contactus & a vertice principali figuræ.

Sit enim AP parabola, S umbilicus ejus, A vertex principalis, P punctum contactus, PO ordinatim applicata ad diametrum principalem, PM tangens diametro principali occurrens in M, & SN linea perpendicularis ab umbilico in tangentem. Jungatur AN & ob æquales MS & SP, MN, & NP, MA & AO parallelæ erunt rectæ AN & OP; & inde triangulum SAN rectangulum erit ad A, & ſimile triangulis æqualibus SNM, SNP: ergo PS eſt ad SN ut SN ad SA. *Q.E.D.*



Corol. 1. PSq eſt ad SNq ut PS ad SA.

Corol. 2. Et ob datam SA eſt SNq ut PS.

Corol. 3. Et concurſus tangentis cujuſvis PM cum recta SN, quæ ab umbilico in ipſam perpendicularis eſt, incidit in rectam AN, quæ parabolam tangit in vertice principali.

PROPOSITIO XIII. PROBLEMA VIII.

Moveatur corpus in perimetro parabolæ: requiritur lex vis centripetæ tendentis ad umbilicum hujus figuræ.

Maneat conſtructio lemmatis, ſitque P corpus in perimetro parabolæ, & a loco Q, in quem corpus proxime movetur, age ipſi SP parallelam

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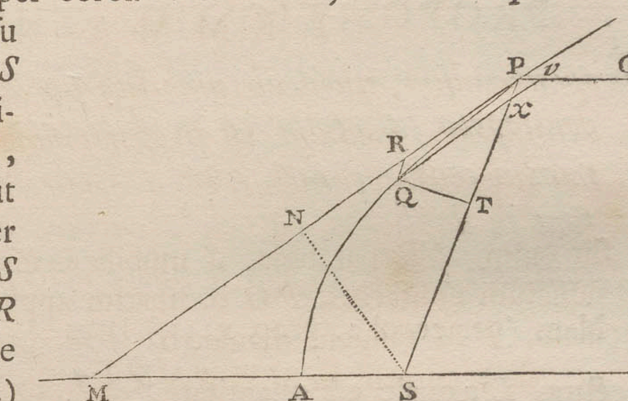
parallelam QR & perpendicularem QT, necnon Qv tangenti parallelam, & occurrentem tum diametro PG in v, tum diſtantiæ SP in x. Jam ob ſimilia triangula Pxv, SPM, & æqualia unius latera SM, SP, æqualia ſunt alterius latera Px ſeu QR & Pv. Sed ex conicis quadratum ordinatæ Qv æquale eſt rectangulo ſub latere recto & ſegmento diametri Pv, id eſt (per lem. XIII.) rectangulo $4PS \times Pv$, ſeu $4PS \times QR$; & punctis P & Q coeuntibus, ratio Qv ad Qx (per corol. 2. lem. VII.) fit ratio æqualitatis. Ergo Qx *quad.* eo in caſu æquale eſt rectangulo $4PS \times QR$. Eſt autem (ob ſimilia triangula QxT, SPN) Qxq ad QTq ut PSq ad SNq, hoc eſt (per corol. 1. lem. XIV.) ut PS ad SA, id eſt, ut $4PS \times QR$ ad $4SA \times QR$, & inde (per prop. IX. lib. V. elem.)



QTq & $4SA \times QR$ æquantur. Ducantur hæc æqualia in $\frac{SPq}{QR}$, & fiet $\frac{SPq \times QTq}{QR}$ æquale $SPq \times 4SA$: & propterea (per corol. 1. & 5. prop. VI.) vis centripeta eſt reciproce ut $SPq \times 4SA$, id eſt, ob datam $4SA$ reciproce in duplicata ratione diſtantiæ SP. *Q.E.I.*

Corol. 1. Ex tribus noviſſimis propoſitionibus conſequens eſt, quod ſi corpus quodvis P ſecundum lineam quamvis rectam PR quacunque cum velocitate exeat de loco P, & vi centripeta, quæ ſit reciproce proportionalis quadrato diſtantiæ locorum a centro, ſimul agitetur; movebitur hoc corpus in aliqua ſectionum conicarum umbilicum habente in centro virium; & contra. Nam datis umbilico, & puncto contactus, & poſitione tangentis, deſcribi poteſt ſectio conica, quæ curvaturam datam ad punctum illud habebit. Datur autem curvatura ex data vi centripeta, & velocitate corporis: & orbes duo ſe mutuo tangentes eadem vi centripeta eademque velocitate deſcribi non poſſunt.

Corol 2. Si velocitas, quacum corpus exit de loco ſuo P, ea ſit, qua lineola PR in minima aliqua temporis particula deſcribi poſ-